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Sampled: 23rd and 24th May, 2012

Report submitted to Mayor Tom Johnson

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General:
This is the final report describing the tree-ring dating (dendrochronology) of beams in the Eliza James House and Barn. On the 23rd and 24th of May 2012, Greg Wiles, Nick Wiesenberg, Will Cary, and Lauren Vargo sampled timbers from the Eliza James House and Barn under the supervision of Mayor Tom Johnson. The objective of this work was to provide calendar dates for the felling of the timbers used in construction.

Dendrochronology is the science of analyzing and dating annual growth rings in trees. Its first application was in the dating of ancient Indian pueblos of the southwestern United States (Douglass 1921, 1929). Andrew E. Douglass is considered the "father" of dendrochronology and developed the application of tree ring data to archaeological dating. The dendrochronological methods first developed by Douglass have evolved and been employed throughout North America, Europe, and much of the temperate forest zones around the world (Baillie, 1982, 1995).

Methods and Analyses:
Seventeen white oak cores and one section were taken from timbers within the Eliza James structures. The Eliza James House, a log cabin, was sampled in various locations including the base of the structure, the floor, and from a supporting timber located on the first floor. The Eliza James Barn, a double crib barn, was sampled throughout the structure based on the condition of the wood available (Table 1).

Cores were prepared and crossdated by Sarah Appleton, Will Cary, and Andy Nash using standard dendrochronological techniques (Figure 1; Holmes, 1983; Stokes and Smiley, 1968). The samples were carefully glued into grooved mounts and sanded to a high polish to reveal the annual tree rings clearly. The rings widths were then measured under a microscope to a precision of ±0.001 mm and then crossdated against each other (Figure 1). The cross-dating of the measurements and assisted by the COFECHA computer program (Holmes 1983).

COFECHA is used to first establish internal, or relative cross-dating among individual timbers from the house. This step is critical because it locks in the relative positions of the timbers to each other, and indicates whether or not the dates of those specimens with outer rings are consistent. Subsequently, the internally cross-dated series are each compared with independently established tree-ring master chronologies compiled from living trees and dated historical tree-ring samples. All of the "master chronologies" are based on completely independent tree-ring samples. In the Eliza James House and Barn study, the regional composite master dating chronologies are derived from more than 500 ring-width series from old growth living trees and historical structures across Ohio (Figure 1). All dating results were compared with independent dating masters and in each case the dating reported here is verified as correct.

Results:
The oak samples were successfully crossdated with our calendar-dated master series (Figure 2). The oak samples with outer rings from the Eliza James House show cut dates in the season after the growing season of 1813 (Figure 3). One section of the house

contained timber that dated to 1816. This one section suggests that an addition or repair to the house was made at that time. Timbers from the Eliza James barn were cut after the construction of the house at an undetermined date due to the lack of outer ring samples obtained from the structure. It is possible that the structure was constructed in the 1820s (Table 1) (Figure 3).

Summary:
Outer ring dates show that many of the timbers used in construction of the Eliza James House were cut in 1813 with the barn following later possibly in the 1820s. No outer ring samples were obtained from the Eliza James Barn preventing a definitive date of the structure. Other samples were taken from the house and date to a similar time period but do not include the outer ring.

Table 1: Table of the outer calendar dates for ten cores sampled from the Eliza James House and seven cores sampled from the Eliza James Barn. The presence of the outer rings (cut dates) is indicated. Note that only those cores that were successfully dated are included in this table.

Eliza James House				
Sample ID	Date calendar years AD	Location	Species	Presence of Outer Ring
MILH01	1803	Floor	Oak	No
MILH02	1813	Floor	Oak	Yes
MILH03	1813		Oak	Yes
MILH04	1808		Oak	No
MILH06	1813		Oak	Yes
MILH07	1813		Oak	Yes
MILH09	1798		Oak	No
MILH13	1813		Oak	Yes
MILH14	1812		Oak	Yes
MILH15	1813		Oak	Yes
MILH21	1813	Section	Oak	Yes
MILH22	1816	Section	Oak	Yes
MILH23	1813	Section	Oak	Yes
Eliza James Barn				
EJB01	1822		Oak	No
EJB02	1812		Oak	No
EJB03	1809		Oak	No
EJB05	1809		Oak	No
EJB06	1805		Oak	No
EJB07	1815		Oak	No
EJB08	1824		Oak	No

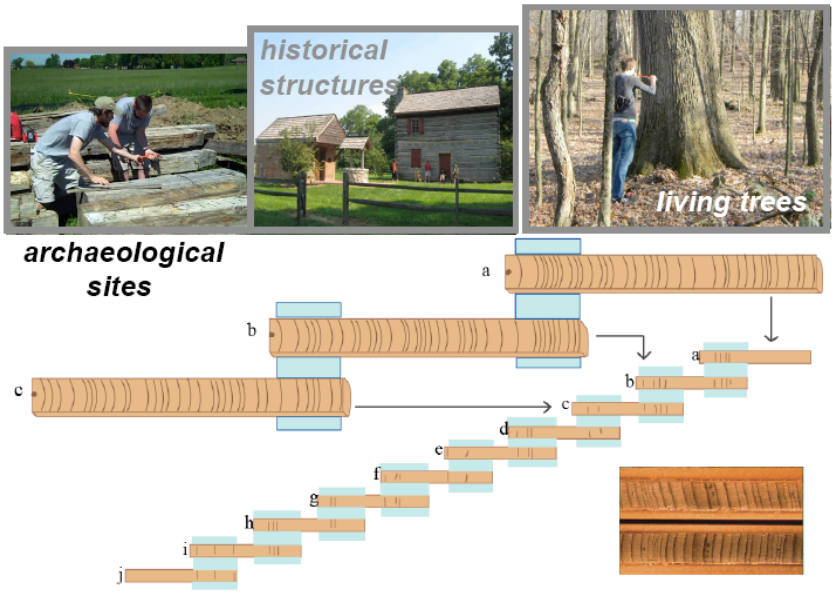

Figure 1: This diagram illustrates the process of tree-ring crossdating. Patterns in ring widths from historic structures and wood associated with archeological sites are matched to living tree-ring chronologies and thus calendar dates can be assigned to each ring.

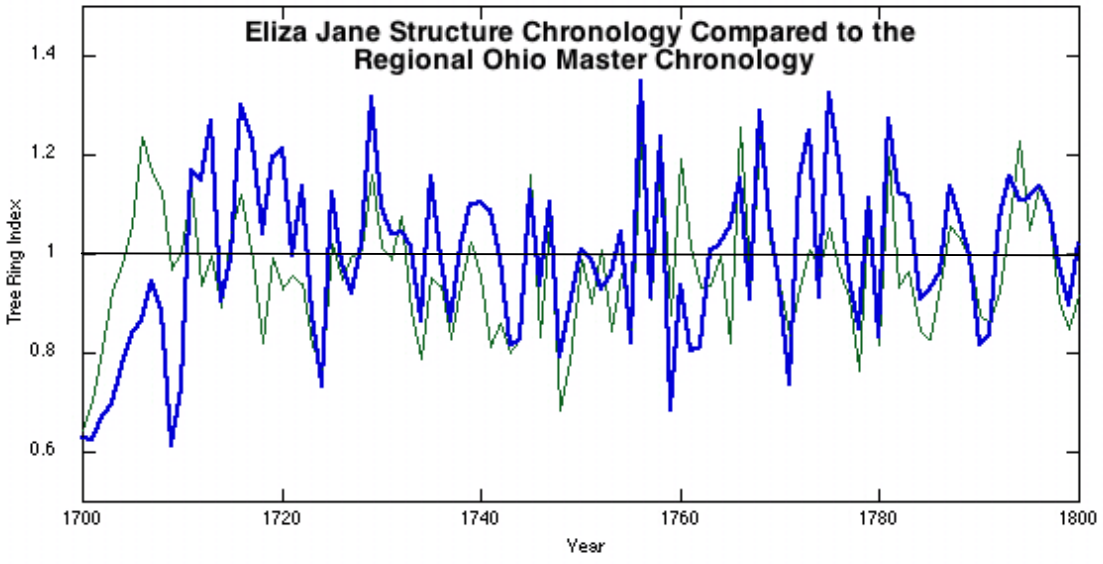

Figure 2: Regional Ohio ring-width series (green) compared with the Eliza James master chronology (blue) of the seventeen total dated samples.

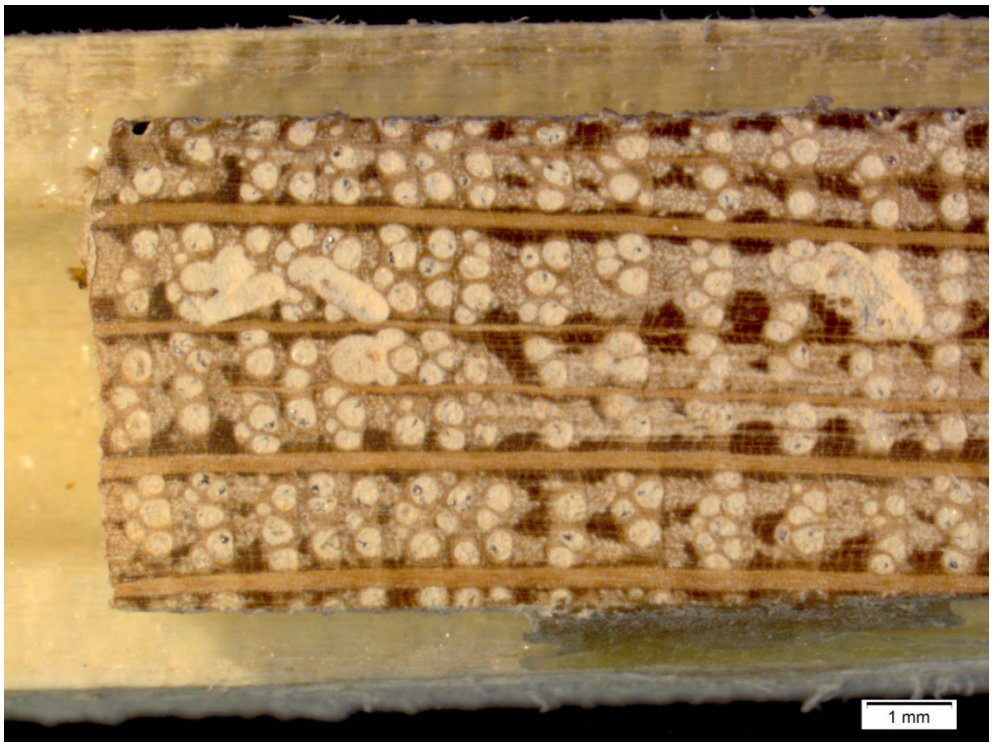

Figure 3: Sample MILH03 showing the end of the core, 1813, with a few bore holes from insects.

References:

Baillie, M.G.L. 1982, Tree-Ring Dating and Archaeology. Croom Helm, London and Canberra. 274 pp.

Baillie, M.G.L. 1995, A Slice Through Time: Dendrochronology and Precision Dating.B.T. Batsford, Ltd., London

Douglass, A.E. 1921, Dating our prehistoric ruins: how growth rings in trees aid in the establishing the relative ages of the ruined pueblos of the southwest. Natural History 21(1), 27-30

Douglass, A.E. 1929, The secret of the southwest solved by talkative tree-rings. National Geographic Magazine 56(6), 736-770.

Holmes, R. L. 1983. Computer-assisted quality control in tree-ring dating and measurement. *Tree Ring Bulletin*, 43 (1), 69-78.

Stokes M. A., and Smiley, T. L., 1968, An introduction to tree-ring dating: Tucson: University of Arizona Press.

The College of Wooster Tree Ring Lab was established in 1998 by Dr Greg Wiles and is part of the Department of Geology at The College of Wooster in Northeast Ohio. The lab provides numerous opportunities for undergraduate research. The lab works on a variety of projects in Ohio and Alaska dating historical structures, glacial advances, and climate analysis using tree-ring records. To date the Wooster Tree Ring lab has dated over one hundred historical structures across Ohio and western Pennsylvania. For more information on past projects please look us up at http://www3.wooster.edu/treering/photos/default.php.